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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/931,125	09/16/97	LEE	H P54508

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EXAMINER

PORTKA, G

ART UNIT

PAPER NUMBER

2187

21

DATE MAILED: 11/29/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

J-0

Office Action Summary

Application No. 08/931,125	Applicant(s) Lee
Examiner Gary J. Portka	Group Art Unit 2187

Responsive to communication(s) filed on Sep 21, 2000

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle 835 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

Claim(s) 1-8 is/are pending in the application.
Of the above, claim(s) _____ is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

Claim(s) 1-8 is/are rejected.

Claim(s) _____ is/are objected to.

Claims _____ are subject to restriction or election requirement.

Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on _____ is/are objected to by the Examiner.

The proposed drawing correction, filed on _____ is approved disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All Some* None of the CERTIFIED copies of the priority documents have been received.

received in Application No. (Series Code/Serial Number) _____.

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

Notice of References Cited, PTO-892

Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

Art Unit: 2187

DETAILED ACTION

1. Claims 1-6 have been amended, and claims 7-8 have been added by Applicant. Claims 1-8 remain pending.

Claim Objections

2. The disclosure is objected to because of the following informalities:
 - a. Claim 6 is objected to because of the following: It appears that the recited fourth and eighth means are the same means. Each substantially recites the reading (or moving) of old parity information from the disk drive to the cache upon the old parity information not being accessed (or found) in the cache. Consequently, the means have not been treated separately in the art rejection below.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1-2 and 6-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones, U.S. Patent 5,572,660.

5. As to claim 1, Jones discloses a memory system comprising:

Art Unit: 2187

- a. Plurality of defect-adaptive devices (214-1 through 214-8) as claimed having a first region storing information needed for data recovery (parity), and a second region storing data (see Figure 2D, and column 10 lines 7-18);
- b. Plurality of caches (254-1 through 254-8) respectively coupled to the devices, each for storing parity information blocks needed for data recovery for the corresponding device (see Figure 2D, and column 10 lines 15-26);
- c. Controller (210) coupled to each device and cache, with means for selectively controlling writing, reading, and obtaining of parity information to/from each memory device, and storing parity information obtained from a device in a corresponding cache (see Figure 3E, column 2 line 62 through column 4 line 6, in particular column 3 lines 30-39; column 10 lines 15-26, and column 11 line 55 to column 12 line 13).

6. As to claim 2, Jones discloses that the controller comprises means for determining if the information needed for data recovery is in the cache (see Figure 3D item 344, and Figure 3E item 370).

7. As to claim 6, Jones discloses a RAID system comprising:

- a. Plurality of disk drives (214-1 through 214-8) with region storing data blocks and region storing parity information (see Figure 2D, and column 10 lines 7-18);
- b. Plurality of caches (254-1 through 254-8) each connected to a corresponding drive and storing parity information (see Figure 2D, and column 10 lines 15-26);

Art Unit: 2187

c. Controller (210) coupled to each disk drive and cache selectively controlling write of data and parity comprising means to:

- i. Select a disk drive upon receiving write instruction (see Figure 3A items 308 and 330);
- ii. Read old data from the disk drive (see Figure 3C item 360);
- iii. Determine if old parity to be read from disk is not accessed in the corresponding cache, and if not then to read the old parity from the disk drive, and load the cache with old parity (see Figure 3E items 370, 376-382, and column 11 line 55 to column 12 line 13);
- iv. Obtain new parity by performing XOR on old data, old parity and new data (see Figure 3F item 390, and column 9 line 16 equation);
- v. Load the corresponding cache with new parity (see Figure 3F item 392);
- vi. Write the new data and new parity on the disk drive (see Figure 3F item 394, and column 3 lines 25-40).

8. As to claim 7, Jones discloses the method for writing and reading a RAID as recited, the step for reducing overhead during read of data for recovery to improve data I/O performance met by the functionally equivalent elements performing the steps described above with regard to claims 1-2 and 6.

9. As to claim 8, Jones discloses the coupled controller, caches, and disks, and that the caches store data recovery information, as described above with regard to claims 1-2 and 6. The determining of information needed for recovery in a disk by using information for data recovery stored in the

Art Unit: 2187

corresponding cache is described at Figure 3F item 390 and column 9 line 16 equation (in Figure 3D, a cache hit in the write back cache at 344 means that old parity is in the cache, which is read to perform the calculation at 390 of Figure 3F).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, U.S. Patent 5,572,660, in view of Holland et al., U.S. Patent 5,455,934.

12. As to claim 3, Jones does not disclose that the information needed for data recovery is sequentially arranged from the most outer cylinder. However, it is well known that the sequential nature of disk access invites a transfer mechanism sequentially from some position, thus improving performance by reducing seek time. As further taught by Holland, arrangement of information on a disk from the outermost cylinders results in higher sustained data transfer rates (see column 9 lines 25-30). It is clear from Jones at column 2 lines 34-58 that the accessing of the parity data in RAID systems limits the performance of these systems, and therefore the advantage of faster access due to reduced seek time, and higher sustained data rates would have motivated an artisan to arrange this information from the outermost cylinder. Thus it would have been obvious to one of ordinary skill

Art Unit: 2187

in the art at the time of the invention to sequentially arrange the recovery information from the most outer cylinder in Jones, because this method reduces seek time, results in higher sustained data rates, and therefore improves performance.

13. As to claim 4, Jones discloses that parity information needed for data recovery is modified to a value obtained through a calculation of new data recovery information (see column 9 lines 8-21).

14. As to claim 5, Jones discloses XORing of previous data, corresponding parity information, and new data (see column 9 line 16 equation).

Response to Arguments

15. Applicant's arguments filed September 21, 2000 have been fully considered but they are not persuasive.

Applicants argue that Jones does not teach updating a cache by reading old parity from the drive to the cache when it is not found in the cache. Examiner does not agree; the steps cited in Figure 3E of Jones, along the right side branch of the figure, describe a cache miss for old parity, and subsequent cache update by reading old parity from the drive.

Applicants have argued regarding the combination of Holland and Jones that *prima facie* obviousness has not been established, that the references do not teach and the action did not explain what suggests the reasons for combining the references, and that no identification has been made of what is ordinary skill in the art. Examiner does not agree; the art of record clearly establishes that the outer tracks of a disk offer improved performance, and as stated in the previous action it is well known that disks are accessed serially; thus it would have been obvious to one of ordinary skill in the

Art Unit: 2187

art to access from the outermost track for performance-limiting data. As cited, Jones teaches that the parity data is such data, and therefore the rationale for combination is maintained.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

17. **Any response to this final action should be mailed to:**

Box AF
Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 308-9051, (for formal communications, please mark "EXPEDITED PROCEDURE")

or:

(703) 305-9731 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

18. Any inquiry concerning this communication from the Examiner should be directed to Gary J. Portka at telephone number (703) 305-4033. The Examiner can normally be reached on weekdays from 9:00 A.M. to 5:30 P.M.

Art Unit: 2187

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Do Yoo, can be reached on (703) 308-4908. The fax phone number for this Group is (703) 305-9731.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, whose telephone number is (703) 305-3900.

GJP

Gary J. Portka

Patent Examiner

November 27, 2000

Do Yoo
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